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Question Paper Code	12873
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B.E. / B.Tech. / M.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

Third Semester

Computer Science and Engineering

(Common to Information Technology and M.Tech. - Computer Science and Engineering)

20ITPC303 - COMPUTER ORGANIZATION AND ARCHITECTURE

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

	<i>Marks</i>	<i>K- Level</i>	<i>CO</i>
1. Recall two key principles used to build a computer.	2	K1	CO1
2. If computer A runs a program in 20 seconds and computer B runs the same program in 25 seconds, how much faster is A than B?	2	K2	CO1
3. What are the overflow conditions for addition and subtraction operation?	2	K2	CO2
4. Give the representation format of single precision floating point number.	2	K1	CO2
5. Present the five stages of instruction executions.	2	K1	CO3
6. List out the advantages of pipelining operations.	2	K2	CO3
7. What are the challenges in parallel processing?	2	K2	CO4
8. Define warehouse scale computers.	2	K1	CO4
9. Draw the basic structure of a memory hierarchy.	2	K2	CO5
10. Why I/O devices cannot be directly connected to the system bus?	2	K2	CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11. a)	Explain the various MIPS instruction formats and illustrate the same with an example.	13	K2	CO1
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OR

b) i)	Translate C code to MIPS assembly code $f = (g + h) - (i + j)$, the variables f, g, h, i and j are assigned to the registers \$s0,\$s1, \$s2, \$s3 and \$s4, respectively.	5	K2	CO1
ii)	Examine the addressing modes of the following sequence of instructions and the operation done in every instruction given below.	8	K2	CO1
	1) lw \$s0, 1200 (\$s1) 2) Mul \$s0,\$s1, \$s2			
	3) Addi \$s0, (\$s0), #1500 4) Move 16(R5), R3			

12. a) i) Perform $X + Y$ and $X - Y$ using 2's complement for the given two binary numbers $X = 0000\ 1010\ 1001\ 0111$ and $Y = 1110\ 1001\ 1010\ 1100$. 6 K2 CO2
- ii) Perform the Booth's operation for the 5-bit signed operand, +23 is the multiplicand, and it's multiplied by -10, the multiplier to get the 10-bit product -230. 7 K2 CO2

OR

- b) i) Briefly explain about the subword parallelism. 6 K2 CO2
- ii) Add the numbers $(0.75)_{10}$ and $(-0.4375)_{10}$ in binary using the floating point addition algorithm. 7 K2 CO2
13. a) With neat sketch explain the basic MIPS implementation with necessary multiplexers and control lines. 13 K2 CO3

OR

- b) Explain the different types of pipeline hazards with suitable examples. 13 K2 CO3
14. a) Elaborate on Flynn's classification of parallel hardware with necessary examples. 13 K2 CO4

OR

- b) Describe the four principle approaches of multithreading with necessary diagrams. 13 K2 CO4
15. a) Outline the need for cache memory and list the three mapping methods of cache memory and explain any two. 13 K2 CO5

OR

- b) Explain the virtual memory address translations in detail with necessary diagrams. 13 K2 CO5

PART - C (1 × 15 = 15 Marks)

16. a) A block set associative cache consists of a total of 64 blocks divided into four block sets. The main memory contains 4096 blocks, each consisting of 128 words. 15 K3 CO6
- a) How many bits are there in a main memory address?
- b) How many bits are there in each of the TAG, SET and WORD fields?
- c) What is the size of cache memory?

OR

- b) Discuss the various memory mapping schemes. 15 K2 CO6